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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/973,498	10/09/2001	Manoj Kumar Chaudhury	DC4960	6559

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EXAMINER
HARAN, JOHN T

ART UNIT	PAPER NUMBER
1733	

DATE MAILED: 09/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/973,498	CHAUDHURY ET AL.	
	Examiner	Art Unit	
	John T. Haran	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the c rrespondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 October 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *26,27,29 and 31-35* is/are allowed.

6)☒ Claim(s) *1-13,15-25,28,30,36 and 37* is/are rejected.

7)☒ Claim(s) *14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4&5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements (IDS) submitted on 3/25/02 and 9/19/02 have been considered.

Claim Objections

2. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

The claim numbering went from claim 21 to 23 then to 22, 23, etc...

The first claim 23 and all subsequent claims have been renumbered claims 22 through 37. The claims will be referred to by the corrected numbering in this action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 24-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 24-25 specify the time of contact of the polymeric material and the adherend implying that they are only in contact for the specified time. This causes confusion because it appears once they are adhered together they remain in contact

indefinitely, if not permanently. It appears the claim should be amended to read that step C, the contacting step, is carried out under pressure for the specific time periods.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 4, 11, 12, 13, 15, 22, 23, and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Chou et al (U.S. Patent 5,019,210).

Chou et al is directed to a method for enhancing the adhesion of polymer surfaces by water vapor plasma treatment that avoids the need for an adhesive when bonding together polymers to form a multi-layer structures useful in microelectronic applications wherein the surfaces of first and second fully cured polymeric bodies are treated with water vapor and thereafter the treated surfaces are disposed together and adhered together (Column 1, lines 15-50 and Column 3, lines 50-54 and 60-65). Chou et al teaches that the polymer surfaces are polyimide (Column 3, lines 11-14). The specification teaches the polymeric material can be polyimide (Specification, page 7, line 6) and that the adherend can be a substrate (Specification, page 6, line 1), which can be polyimide (Specification, page 9, line 5) and therefore Chou et al anticipates claim 1.

Regarding claim 4, Chou et al teaches aging (storing) the plasma treated polymer surfaces before contacting them for a duration of as long as 8 days (Column 4, lines 55-58).

Regarding claim 11, Chou et al teaches the polymer can be polyurethane (Column 5, line 57). It is noted that the specification teaches that both the polymeric material and the substrate (adherend) can be an elastomer such as polyurethane (Specification, paragraphs 0024 and 0028).

Regarding claims 12 and 30, Chou et al teaches the polymeric material is polyimide (Column 3, lines 11-14). Chou et al also teaches the polymeric material being phenolic (Column 5, line 59).

Regarding claims 13 and 15, Chou et al teaches the polymer is a cured organic polymer (Column 3, lines 50-54).

Regarding claims 22-23, Chou et al teaches the plasma treatment of the adherend (polyimide) is carried out at a temperature above 15 degrees Celsius and below 400 degrees Celsius (Column 4, lines 17-28).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2-10, 16-21, 24-25, 28, and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chou et al (U.S. Patent 5,019,210 as applied to claims 1, 12, 13, 15, 22, 23, and 30 above.

Regarding claims 2 and 3, Chou et al is silent towards whether or not the plasma treatment of the polymer sheets are carried out concurrently or sequentially. One skilled in the art would have readily appreciated that they were either plasma treated at the same time or one after the other and that the two choices are obvious one over the other. One skilled in the art would have readily appreciated that the choice between the two methods would have depended upon a number of factors such as the relative size of the plasma chamber and the polymer sheets. However it would have been within the purview of one skilled in the art to decide to plasma treat them at the same time or one after the other. It would have been obvious to one of ordinary skill in the art at the time the invention was made to plasma treat the polymer surfaces concurrently or sequentially in the method of Chou et al.

Claim 4, although rejected above under 102(b) is alternatively rejected under 103(a). Chou et al teaches aging the plasma treated polymer surfaces before contacting them for up to 8 days. One skilled in the art would have readily appreciated that the aging process is equivalent to storing the plasma treated polymer surfaces and that the aging process would entail storing the treated polymers. It would have been obvious that the polymer treated surfaces are stored in the method of Chou et al.

Regarding claims 5 and 6, as noted above, Chou et al solves the problem of eliminating adhesive when bonding a plurality of layers of polymer to form a multi-level

structure (Column 1, lines 15-50). One skilled in the art would have readily appreciated performing the steps of Chou et al repeatedly to form a multi-level structure as in the prior art. It would have been obvious to one of ordinary skill in the art at the time the invention was made to repeat the process of Chou et al one or more times to obtain a multi-level polymer structure.

Regarding claims 7-10, Chou et al is silent towards the modulus of the various types of polymeric materials taught. One skilled in the art would have readily appreciated that the modulus of the polymeric material would depend upon the specific type of polymeric material and it would have been within the purview of one skilled in the art to utilize a polymeric material with the desired modulus in the method of Chou et al.

Regarding claims 16-18, Chou et al is silent towards the type of plasma treatment utilized or the pressure, however Chou et al does teach using known methods of generating plasma, and corona discharge, dielectric barrier discharge and glow discharge and treatment at a pressure up to atmospheric pressure are all known and it would have been obvious to use them in the method of Chou et al.

Regarding claim 19, as noted above Chou et al is silent whether the polymer surfaces are plasma treated independently, however, as explained above such is obvious. Chou et al furthermore teaches use water vapor as the gas for the plasma treatment of both surfaces (Column 3, lines 7-10).

Regarding claims 20 and 21, as noted above Chou et al is silent whether the polymer surfaces are plasma treated independently, however, as explained above such

is obvious. Chou et al furthermore teaches carrying out the plasma treatment of the polymer surfaces for a period of about 0.1 minutes to about 1 hour. One skilled in the art would have readily appreciated that the exact duration would depend upon a number of factors including the material worked upon, the pressure, and the temperature. It would have been within the purview of one skilled in the art to vary the parameters such that the period of plasma treatment was at least 1 millisecond and up to about 30 minutes in the method of Chou et al.

Regarding claims 24 and 25, Chou et al teaches contacting the surfaces under pressure to bond them together but is silent towards the time. One skilled in the art would have readily appreciated that the time would have depended upon a number of other factors, such as the type of polymeric materials, the amount of pressure, the temperature, etc.. It would have been within the purview of one skilled in the art to vary the working parameters such that the period of contact under pressure is at least about 0.1 seconds and up to about 12 hours in the method of Chou et al.

Regarding claim 28, Chou et al teaches aging the plasma treated polymer surfaces before contacting them for up to 8 days. One skilled in the art would have readily appreciated that the aging process is equivalent to storing the plasma treated polymer surfaces and that the aging process would entail storing the treated polymers. One skilled in the art would have readily appreciated that the storage period is dependent upon a plurality of factors and it would have been within the purview of one skilled in the art to store the plasma treated polymers for at least about 1 hour before contacting them and bonding them together in the method of Chou et al. It is also noted

that this claim does not require the adherend to be stored, just that it be capable of being stored because of the use of the word "optionally".

Regarding claims 36 and 37, as noted above, Chou et al solves the problem of eliminating adhesive when bonding a plurality of layers of polymer to form a multi-level structure (Column 1, lines 15-50). One skilled in the art would have readily appreciated performing the steps of Chou et al repeatedly to form a multi-level structure as in the prior art. It would have been obvious to one of ordinary skill in the art at the time the invention was made to repeat the process of Chou et al one or more times to obtain a multi-level polymer structure.

Allowable Subject Matter

10. Claims 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claims 26, 27, 29, and 31-35 are allowed.

12. The following is an examiner's statement of reasons for allowance:

Regarding claim 14, the prior art of record fails to suggest the claimed method wherein the polymeric material is a cured silicone resin, a cured silicone elastomer, or a cured silicone rubber. It is known to plasma treat such silicone materials however there is no suggestion to do so in combination with plasma treating an adherend and then contacting the two plasma treated surfaces.

Regarding claim 26, the prior art of record fails to suggest the claimed method of plasma treating the polymeric material for 30 seconds and the adherend for 30 minutes.

Chou et al teach the polymer bodies can be plasma treated from 0.1 minutes to an hour or more but provides no suggestion of plasma treating one for 30 seconds and the second for 30 minutes.

Regarding claim 27, the prior art of record fails to suggest the claimed method of carrying out the plasma treatment with a gas comprising air, argon, carbon dioxide, helium, nitrogen, nitrous oxide, ozone, or combinations thereof. Chou et al is specifically directed to using water vapor as the plasma gas and provides no suggestion of using any other type of gas.

Regarding claim 29, the prior art of record fails to suggest the claimed method wherein the substrate comprises ceramic. It is known to plasma treat such ceramic materials however there is no suggestion to do so in combination with plasma treating an adherend and then contacting the two plasma treated surfaces.

Regarding claim 31, the prior art of record fails to suggest the claimed method of plasma treating a semiconductor and contacting it with a plasma treated polymeric material to adhere the two together.

Dery et al (U.S. Patent 6,074,895) teaches plasma treating an IC chip and a chip carrier in order to enhance adhesion of the IC chip and the chip carrier with an encapsulant (See abstract). There is no suggestion of plasma treating the encapsulant or for the plasma treated polymeric passivation layer of the chip to contact and adhere to the plasma treated surface of the chip carrier.

Yew et al (U.S. Patent 6,602,803) teaches plasma treating a protective polymer layer on a chip and directly attaching it to a substrate. There is no suggestion of plasma

treating the substrate or towards plasma treating the chip surface or protective polymer layer before applying the protective polymer layer to the chip surface.

13. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John T. Haran** whose telephone number is **(703) 305-0052**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael W. Ball can be reached on (703) 308-2058. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

John T. Haran
Examiner
Art Unit 1733